UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

UNITED STATES OF AMERICA, Plaintiff, v. SOLVENTS RECOVERY SERVICE OF NEW ENGLAND, INC., Defendant.	Civil Action No. H-79-704(JAC)

SUPPLEMENTAL DECLARATION OF MATTHEW HOAGLAND

I, Matthew Hoagland, declare as follows:

1. I am presently employed as a Geologist in the Superfund Support Section of the Waste Management Division of the United States Environmental Protection Agency (EPA) Region I in Boston, Massachusetts.

2. On July 6, 1990, I signed a declaration for submission in this matter ("July 1990 Declaration") describing my personal background, my involvement with the facility in Southington, Connecticut owned and operated by Solvents Recovery Service of New England, Inc. ("SRSNE"), and the requirements imposed on SRSNE under the 1983 Consent Decree with regard to the on-site groundwater recovery system.

3. My July 1990 Declaration also identified several major construction defects in this groundwater recovery system and noted that SRSNE has failed to operate the system as required, to

file the required verification reports and to report on groundwater quality as required. My July 1990 Declaration has been submitted to the Court as Exhibit 1 accompanying the Motion of the United States to Enforce the 1983 Consent Decree.

4. This Supplemental Declaration is submitted in order to address several of the issues raised by SRSNE in its September 27, 1990 opposition to the government's motion to enforce the Consent Decree.

Projected Cone of Influence

5. The 1983 Consent Decree defines the term "cone of influence" but does not determine what the required reach of the cone of influence must be. The shape and extent of the cone of influence was selected by SRSNE and proposed to EPA in the 1983 Engineering Report and the 1984 Final Design Plans. 1983 Engineering Report (Exhibit 8); 1984 Final Design Plans (Exhibit 10). Once EPA approved SRSNE's proposal, SRSNE became obligated to either achieve the projected influence or propose a new cone of influence[1].

6. The Consent Decree and the approved specifications recognized that there would be uncertainties with respect to the slope of the water table, fluctuation of the water table and

---

[1] The term "influence" or "cone of influence" are used in my July 1990 Declaration and in this document in the manner agreed to by SRSNE and EPA in the Consent Decree. Although this definition is close to the scientifically accepted definition of "capture zone", this is of no significance because the definition agreed to for purposes of the Consent Decree is unambiguous and the parties have used the term consistent with the Consent Decree definition since 1983.

other factors such as changes in lithologies. The Consent Decree dealt with these uncertainties by requiring SRSNE to redesign and rebuild the system if it could not meet the projected influence due to design or construction deficiencies. If SRSNE's calculation of the original cone of influence was faulty (e.g. because it failed to take into consideration the actual slope and elevation of the water table or failed to correctly estimate the location of the bedrock), SRSNE was required to revise this aspect the design of its system[2].

7. Similarly, if SRSNE's use of the Theis nonequilibrium equation was in error as Guswa indicates, Guswa Cert. at 9-11, SRSNE should have dealt with this design deficiency as soon as it was recognized by submitting modified engineering plans and specifications under Par 8.G of the Consent Decree.

Penetration of the Aquifer

8. Critical to achieving the overall projected influence is the depth of drawdown at each recovery well. The required drawdowns, as specified by SRSNE in the 1983 Engineering Report and the 1984 Final Design Plans, range from 7.74 feet in the center of the on-site system to 5.17 feet at the extreme ends of the system. These minimum required drawdowns are stated in

---

[2] The Guswa Certification provides a projected cone of influence for one likely water table slope and elevation setting. Guswa Cert. at Figure 3. This figure is a useful comparison only for water table conditions that repeat the March 11, 1980 condition or for other natural water table elevations with the same slope (realizing that the water table contour lines would also differ accordingly).

relation to the natural water level conditions which would otherwise prevail at the site during the day or season at issue. 1983 Engineering Report at 12 (Exhibit 8); 1984 Final Design Plans at 11 and Drawing 3 (Exhibit 10). These minimum drawdowns should not change with slope of the water table, elevation of the water table or lithology of the aquifer materials.

9. My July, 1990 Declaration showed that three of the 25 on-site system recovery wells (Wells 1, 2 and 19) did not adequately penetrate the aquifer even at the time the system began operating. This conclusion was based on the baseline gauge readings without consideration for seasonal fluctuations[3]. July, 1990 Declaration at 12-16 (Exhibit 1); Baseline Gauge Readings (Exhibit 19).

10. The water level measurements provided in the Guswa affidavit indicate than many of the other recovery wells also fail to adequately penetrate the aquifer. Guswa Cert. at 12-13. Assuming that Guswa is correct that the natural fluctuation of water level at the Southington facility is about four feet above and below the baseline elevation, the on-site system wells should have been constructed so that the screens penetrated enough of the aquifer not only to establish their individual drawdowns on

---

[3] It should be noted that Table 1 of the Guswa Certification and its supporting description are misleading because the table lists water levels for the wells using data collected at a time prior to when the wells were even installed. The actual length of the water column is more accurately represented by SRSNE's baseline gauge readings. Guswa Cert. at 10 and Table 1; July, 1990 Declaration at 14 (Exhibit 1); Baseline Gauge Readings (Exhibit 19).

the date of initial operation, but to maintain that drawdown relative to a water table that is likely to be lowered by seasonal changes by four feet. If a hypothetical pumping well was required to maintain a drawdown of 6 feet, it would need to be constructed so that it could withstand four feet of seasonal change. Therefore, this hypothetical well would need to penetrate a minimum of 10 feet in order to maintain its required drawdown at all times of the year.

11. Using this analysis, it is clear that four additional wells were not constructed at the proper depth below the water table and that still five other wells would have a margin of safety of less than a foot. Guswa lists seven recovery wells (Wells 1, 2, 4, 14, 15, 19, and 23) where there were "several measurements which indicated that water levels were at or below the well bottom." These potential or known problem wells have all been identified with an asterisk ("*") in Attachment A of this Declaration.

Impact of the System

12. Guswa acknowledges that SRSNE has created a situation where it is impossible to directly determine the effects of pumping versus seasonal influences when interpreting the water level data from the recovery wells. Guswa Cert. at 13. This fact, along with the fact that water level measurements were never collected for more than two of the 18 hydraulic verification wells, has produced as situation where none of the pre-1990 hydraulic verification reports provide nearly enough

data on which to draw a contour map or determine the actual contours of the cone of influence with any certainty. Moreover, the February 22, 1990 and May 21, 1990 Reports clearly indicate that the cone of influence was not being met even in comparison to Figure 3 of the Guswa Certification. February 22, 1990 Report (Exhibit 42); May 31, 1990 Report (Exhibit 43); Guswa Cert. at Figure 3.

13. Guswa also states that "when operating, the on-site system has been effective in removing contaminated groundwater from beneath the SRSNE site, and has likely prevented off-site migration of contaminated groundwater from the SRSNE site" (emphasis added). Guswa Cert. at 3. However, this statement is largely meaningless because there is no evidence that there has ever been a time when the system has been fully operational. At least one pump was not in operation for 95% of the period of time when operating records exist and at least two pumps were not operating for 42% of this same period. July, 1990 Declaration at 22-25, Attachments A and B (Exhibit 1). Further, Guswa's statements regarding the removal of groundwater and prevention of migration provide no quantitative indication of the degree to which the system has either been effective or been in compliance with the Consent Decree.

Penetration of the Bedrock

14. The bedrock underlying the SRSNE facility is primarily sandstone and siltstone. Groundwater containing contaminants flows into and out of this bedrock. The groundwater can flow

between interconnected pore spaces within the rock or through interconnected fractures, the latter being generally more efficient than the former. In some situations interconnected water bearing fractures may transmit water more efficiently than the overburden aquifer systems.

15. Groundwater can be extracted from bedrock via groundwater recovery wells. Indeed, it is commonplace to develop and implement remedial actions at Superfund Sites based on extraction and treatment of contaminated groundwater from bedrock.

16. As stated above, the recovery wells of the on-site system were each required to be able to produce specific drawdowns regardless of seasonal changes. The wells were also required to penetrate the bedrock aquifer by three feet. However, if any well could not attain its required drawdown when installed three feet into the bedrock, then the bedrock would have to be further penetrated to satisfy drawdown requirements. The approved specifications contain no maximum depth for the on-site system recovery wells.

17. SRSNE states, without any technical support, that there is "no groundwater" near Wells 1 and 2 and that there is "no potential for contaminated groundwater to migrate from the SRSNE facility near those wells." SRSNE Opposition at 2. This is clearly wrong, and contradicts boring log information provided to SRSNE by its own consultants, Wehran, Inc. in their January, 1982 report. The boring log for monitoring well WE-3, the

closest pre-existing monitoring well to Wells 1 and 2, indicates a thickness of at least 14.5 feet of weathered and fractured bedrock. A zone of highly fractured bedrock is described at a depth of 9.9 feet below the bedrock surface. Two other boring logs for monitoring wells, WE-1 and WE-6, also note the presence of fractured bedrock. The groundwater is likely to be close to where the SRSNE's own expert, John Guswa, has drawn it. Guswa Cert. at Figure 4. Thus, further penetration of the bedrock at Wells 1 and 2 would have contributed to efficacy of the on-site system and reduced off-site migration.

Grouping of Wells

18. SRSNE claims that it could not group the wells by flow rate, as required, because EPA would not issue a water discharge permit. Duncan Cert. at 8. This rationale is flawed for three reasons. First, EPA does not issue permits or administrate the water discharge permit program in Connecticut. This program is administered by the State Department of Environmental Protection. SRSNE provides no evidence that it ever contacted the State of Connecticut Department of Environmental Protection with regard to this issue. Second, SRSNE could easily have used alternate methods for disposal of contaminated water off-site. SRSNE could have utilized 55 gallon drums[4] or its own tank trucks to ship the contaminated water to a permitted facility. There are probably very few other companies in New England who are better

[4] SRSNE's Consultants, Wehran, Inc. used drums to store the well water from the pumping test used in the design of the on-site system.

equipped and have more resources readily available to utilize these alternate methods of disposal. Third, SRSNE could have regrouped the wells at any time after initial startup up of the system in December 1985.

Water Quality

19. Guswa tabulates water quality data for monitoring wells TW-7A, TW-7B and TW-8A for several sampling rounds between the years 1980 to 1989. Guswa Cert. at Tables 1-3. Guswa's conclusions are subject to question because there is no documentation to support the laboratory quality of these data and there is no documentation recording among other things, whether the samples were representative of the particular aquifer zone being sampled; properly preserved, handled and transported; and analyzed within proper holding times. Notwithstanding these above shortcomings, the data provided by Guswa indicates that significant groundwater contamination continues to migrate from the SRSNE facility.

Redesign of the System

20. SRSNE implies that the unanticipated conditions at the site make it impossible to achieve compliance with the Consent Decree. There is no foundation for this suggestion. Based on the current information regarding the hydrogeological conditions at the Southington facility, there is no reason to doubt that SRSNE, in consultation with engineering and hydrogeological professionals, could design and construct a groundwater recovery

system which would (if operated properly and continuously by SRSNE) maintain an effective barrier to off-site migration.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed on November 6, 1990 at Boston, Massachusetts.

Matthew R. Hoagland

Matthew R. Hoagland

ATTACHMENT A

Penetration of aquifer by recovery wells (feet).

Well No.	Projected Drawdown[1]	Baseline Gauge Readings[2]	Baseline Reading minus Projected Drawdown[3]
1***	5.17	0	-5.17
2***	5.97	0	-5.97
3**	6.53	10.0	+3.47
4**	6.95	10.8	+3.85
5*	7.27	12.2	+4.93
6	7.53	13.7	+6.17
7	7.74	14.2	+6.46
8	7.74	14.0	+6.26
9	7.74	15.0	+7.26
10	7.74	15.0	+7.26

[1] October, 1983 Engineering Report at 12 (Exhibit 8).

[2] The true length of the water column in the recovery wells as measured in January 1986. Baseline Gauge Readings (Exhibit 19).

[3] The saturated thickness of the aquifer as penetrated by the recovery wells once the correct drawdown is achieved for the water table elevation that existed when baseline measurements were taken in January, 1986. Negative values indicate conditions where the wells were not installed deeply enough to produce the projected drawdown for that well.

***** denotes recovery wells that were not installed deeply enough when baseline gauge readings were taken in January, 1986.**

**** denotes recovery wells that were not installed deeply enough to remain in operation once seasonal influences cause the natural water table were to be lowered by four feet.**

*** denotes recovery wells with less than a foot margin of safety once seasonal influences cause a natural four foot lowering of the water table.**

ATTACHMENT A

Penetration of aquifer by recovery wells (feet).

Well No.	Projected Drawdown	Baseline Gauge Readings	Baseline Reading minus Projected Drawdown
11	7.74	13.0	+5.26
12	7.74	15.7	+7.96
13	7.74	13.0	+5.26
14*	7.74	12.0	+4.26
15*	7.74	12.0	+4.26
16	7.74	14.2	+6.46
17	7.74	13.2	+5.46
18	7.74	13.7	+5.96
19***	7.74	5.5	-2.24
20**	7.53	9.8	+2.27
21*	7.27	11.3	+4.03
22	6.95	15.8	+8.85
23**	6.53	9.5	+2.97
24**	5.97	6.6	+0.63
25*	5.17	9.3	+4.13

***** denotes recovery wells that were not installed deeply enough when baseline gauge readings were taken in January, 1986.**

**** denotes recovery wells that were not installed deeply enough to remain in operation once seasonal influences cause the natural water table were to be lowered by four feet.**

*** denotes recovery wells with less than a foot margin of safety once seasonal influences cause a natural four foot lowering of the water table.**

ATTACHMENT B

Interpretation of YWC Well Logs

This attachment provides in detail my interpretation of the YWC Well Logs. YWC Well Logs (Hulm Cert., Exhibit 21). All measurements are described in feet (') and inches (") below grade.

1. For Well 1, the boring logs indicate the following:

    a. casing refusal was encountered at 17.5' (or 17'6");

    b. a boulder approx. 2'6" thick was cored through before bedrock was encountered;

    c. therefore, bedrock was encountered at a depth of 20';

    d. coring continued to a depth of 21'5" which means the core was advanced through bedrock by 1'5"; and

    e. the bottom of the well screen was set at 20'8" which is 8" above the bottom of the borehole and 9" into the bedrock.

2. For Well 2, the boring logs indicate the following:

    a. casing refusal occurred at 13'3";

    b. a boulder approx. 1'6" thick was cored through before bedrock was encountered;

    c. therefore, the depth to bedrock is 14'9" below grade,

    d. the bedrock was cored to a depth of 17'5" which means the core was advanced through the bedrock by 2'8";

    e. the bottom of the well screen was set at 17'0" which is 5" above the bottom of the borehole and 2'3" into the bedrock

3. For well 4, the boring logs indicate the following;

    a. the boring logs state "see field notes" which is probably necessary in order to fully decipher the information presented;

    b. casing was spun to 24' below grade--this presents a discrepancy because either:

        i. bedrock could not have been shallower than 24', or

ii. the casing was spun through the bedrock from a depth of 11'9" to 24' and that the spun casing was also cored through this interval;

c. the screened interval is from 16'1" to 26'10" which indicates that either:

i. the screen is entirely in bedrock, and

ii. screen is installed below the bottom of the boring.

d. I interpret the logs to indicate that the bedrock was no shallower than 24' (the refusal depth), therefore the screen is installed 2'10" into the bedrock at a depth of 26'10".

4. For Well 5, the boring logs indicate the following:

a. refusal and the top surface of the bedrock was encountered at 24'3";

b. coring of bedrock occurred to a depth of 26'3" which means that the bedrock was penetrated by 2';

c. the bottom of the screen was set at 26'0" which is 3" above the bottom of the borehole 1'9" below the top of the bedrock.

5. For Well 6, the boring logs indicate the following:

a. bedrock coring began at a depth no higher than 22'11"-- a cobble in the tip of the core barrel indicates that this coring did not begin in the bedrock;

b. coring occured to a depth of 25'11" or a maximum of 3' into the bedrock;

c. the bottom of the well screen was set at 25'9" which is 2" above the top of the borehole or no more than 2'10" below the top surface of the bedrock.

6. For Well 7, the boring logs indicate the following:

[redacted]

a. bedrock coring began at a depth no higher than 20'3"-- a cobble in the core recovery indicates that this coring did not begin in the bedrock;

b. coring occured to a depth of 23'3" or a maximum of 3' into the bedrock;

c. the bottom of the well screen was set at 23'1" which is 2" above the top of the borehole or no more than 2'10" below the top surface of the bedrock.

7. For Well 8, the boring logs indicate the following:

a. bedrock coring began at a depth of 20'10";

b. the coring penetrated the bedrock to a depth of 23'10" or 3' into the bedrock;

c. the bottom of the well screen was set at 23'7" which is 3" above the top of the borehole or 2'9" below the top surface of the bedrock.

8. For Well 9, the boring logs indicate the following:

a. bedrock coring began at a depth of 21'1";

b. the coring penetrated the bedrock to a depth of 24'1" or 3' into the bedrock;

c. the bottom of the well screen was set at 24'0" which is 1" above the top of the borehole or 2'11" below the top surface of the bedrock.

9. For Well 10, the boring logs indicate the following:

a. bedrock coring began at a depth no higher than 21'10"-- a cobble in the core recovery indicates that this coring did not begin in the bedrock;

b. coring occured to a depth of 24'10" or a maximum of 3' into the bedrock;

c. the bottom of the well screen was set at 24'8" which is 2" above the top of the borehole or no more than 2'10" below the top surface of the bedrock.

10. For Well 11, the boring logs indicate the following:

a. sediments existed to a depth of 22';

b. casing refusal (indicating the possibility that the bedrock surface was encountered) occured at a depth of 22'4"-- a cobble in the core recovery indicates that bedrock may not have actually been encountered at the 22'4" depth;

c. coring occured to a depth of 24'4" or a maximum of 2' into the bedrock;

d. the bottom of the well screen was set at 24'1" which is 3" above the top of the borehole or no more than 1'9" below the top surface of the bedrock.

11. For Well 12, the boring logs indicate the following:

a. bedrock coring began at a depth no higher than 23'1"-- the core barrel was plugged so there is little evidence to indicate that bedrock was encountered during the coring attempt;

b. coring occured to a depth of 26'1" or a maximum of 3' into the bedrock;

c. the bottom of the well screen was set at 25'8" which is 5" above the top of the borehole or no more than 2'7" below the top surface of the bedrock.

12. For Well 13, the boring logs indicate the following:

a. bedrock coring began at a depth no higher than 20'9"-- the core barrel was plugged so there is little evidence to indicate that bedrock was encountered during the coring attempt;

b. coring occured to a depth of 23'9" or a maximum of 3' into the bedrock;

c. the bottom of the well screen was set at 23'8" which is 1" above the top of the borehole or no more than 2'11" below the top surface of the bedrock.

13. For well 14, the boring logs indicate that the borehole was drilled to 23'8" and the screen was set at 32'6". This configuration is impossible because the screen can not be set below the bottom of the borehole.

14. For Well 17, the boring logs indicate the following:

a. bedrock coring began at a depth no higher than 22'2"-- the core barrel appears to have been plugged so there is little evidence to indicate that bedrock was encountered during the coring attempt;

b. coring occured to a depth of 25'2" or a maximum of 3' into the bedrock;

c. the bottom of the well screen was set at 25'1" which is 1" above the top of the borehole or no more than 2'11" below the top surface of the bedrock.

15. For Well 19, the boring logs indicate the following:

a. casing refusal (indicating the possibility that the bedrock surface was encountered) occured at a depth of 17'3";

b. coring occured to a depth of 19'0" or 1'9" into the bedrock;

c. the bottom of the well screen was set at 18'3" which is 9" above the bottom of the borehole or 1' below the top surface of the bedrock.

16. For Well 20, the boring logs indicate the following:

a. bedrock coring began at a depth of 18'6";

b. the coring penetrated the bedrock to a depth of 21'6" or 3' into the bedrock;

c. the bottom of the well screen was set at 21'3" which is 3" above the bottom of the borehole or 2'9" below the top surface of the bedrock.

17. For Well 24, the boring logs indicate the following:

a. casing refusal and coring began at 11'4", but the first 3'9" were through a gneiss boulder--to a depth of 15'1";

b. bedrock ("ss" is interpreted to mean the sandstone bedrock) was questionably encountered between 15'4" and the bottom of the borehole at 16'4";

c. the bottom of the well screen was set at 16'3" which is 1" above the bottom of the borehole and 11" below the top surface of the bedrock, if it is in the bedrock at all.

18. For well 25, the boring logs indicate:

a. casing refusal and coring began at 12'1", but the first 4' were through a gneiss boulder--to a depth of 16'1";

b. bedrock ("ss" is interpreted to mean the sandstone bedrock) was encountered at 16'5" and was penetrated

10" by coring to a total depth 17'3";

c. the bottom of the well screen was set at 16'11" which is 4" above the bottom of the borehole and 6" below the top surface of the bedrock.